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CHEMICAL INVENTORY

This procedure shall be used to collect chemical inventory data and report it to the Environment, Safety, Health and Assurance (ESH&A) Office. This procedure shall be utilized by group leaders, program directors/department managers, the Environment, Safety, Health and Assurance (ESH&A) Office, the Ames Laboratory Emergency Coordinator, and Ames Laboratory employees who are responsible for chemical storage, purchasing, and control.

1.0 APPROVAL RECORD

- Reviewed by: Document Control Program Manager (Hiliary Burns)
- Reviewed by: Facilities & Engineering Services Assistant Manager (Terry Herrman)
- Approved by: Manager, ESH&A (Sean Whalen)
- Approved by: Deputy Director (Tom Lograsso)

The official approval record for this document is maintained by the Training and Documents Office, 105 TASF.

2.0 REVISION/REVIEW INFORMATION

The revision description for this document is available from and maintained by the author.

3.0 PURPOSE AND SCOPE

In order to meet diverse regulatory requirements and support responsible work planning and control activities, the Ames Laboratory must maintain an inventory of on site hazardous chemicals. For operational areas that do not meet the definition of a research laboratory, such as facilities workshops and custodial spaces, the inventory is required by 29 CFR 1910.1200, Hazard Communication. For laboratores, maintaining a chemical inventory is a best management practice that supports responsible risk management.This procedure describes how research and operational entities shall collect, maintain, and report their inventory data to Environment, Safety, Health and Assurance (ESH&A).

4.0 DEFINITIONS AND DESCRIPTIONS

Activity Supervisor: A person designated by the group leader with responsibility for supervision and coordination of the development and/or operation of an activity.

Carcinogen: Any substance or mixture of substances, including alloys, that meets one of the following criteria:

- Regulated by OSHA as a carginogen; or
- Listed under the category “known to be carcinogens”, in *Annual Report on Carcinogens* by the National Toxicology Program (NTP), or
- Listed under Group 1 (“Carcinogenic to humans”) by the International Agency for Research on Cancer Monographs (IARC) (Vol. 1-48 and Supplements 1-8); or
- Listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
    - After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m 3; or
    - After repeated skin application of less than 300 mg/kg of body weight per week;or
    - After oral dosages of less than 50 mg/kg of body weight per day.

- A mixture shall be classified as a carcinogen when at least one ingredient has been classified as a carcinogen and is present at or above 0.1%.

Chemical Hygiene Officer (CHO): means an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan.

Chemical Hygiene Plan (CHP): A Chemical Hygiene Plan (CHP) is a written plan that describes and governs the procedures to be used in a given laboratory to protect employees from physical and health hazards associated with the use of hazardous chemicals. The chemical hygiene plan for the Ames Laboratory may be found in Section 4 of the ESH&A Manual. The SOPs and other risk analysis and control documents found in the Readiness Review are considered to be elements of the individualized CHP for the laboratory.

Chemical Inventory: A list of the hazardous chemicals stored or used in a defined physical space, including name or description of the chemical, physical state, and quantities. For the purposes of the required chemical inventory, laboratory-prepared or created materials (samples, reaction intermediates) may be inventoried in aggregate, as long as the hazards are similar.

Group Leader: A person who reports directly to a Division Director (DD), Institute Director (ID), Program Director (PD) or Department Manager (DM) and who has line management responsibility for space, equipment, safety, activities, and employees. The group leader is responsible for the overall management of group activities and shall ensure that chemical inventories are collected and reported at least annually in accordance with this procedure.

ESH&A: The Environment, Safety, Health & Assurance Office at the Ames Laboratory.

Hazardous Chemical: Any chemical which can cause a physical or a health hazard. Chemical manufacturers and importers are required to determine if the chemicals they produce or repackage meet the definition of a hazardous chemical. A chemical mixture may be considered as a whole or by its ingredients to determine its hazards. It may be considered as a whole if it has been tested as a whole and a Safety Data Sheet (SDS) has been issued accordingly. Otherwise, the mixture must be evaluated by its components. If the mixture contains 1.0 percent or more of a hazardous chemical or 0.1 percent of an ingredient listed as a carcinogen or suspected carcinogen, the whole mixture is assumed to have the same health and/or carcinogenic hazards as its components.

Highly Toxic Chemical: For the purposes of this procedure, a highly toxic chemical is defined as one with a GHS Acute Toxicity Category of 1 or 2.

Group Safety Representative: An individual designated by the group leader to assist with the implementation of safety-related procedures and to serve as a liaison between the group leader and ESH&A.

OSHA "HazCom Standard": The Occupational Safety and Health Administration (OSHA) regulation for hazard communication, found at 29 CFR 1910.1200, Hazard Communication.

OSHA "Laboratory Standard": The Occupational Safety and Health Administration (OSHA) regulation, found at 29 CFR 1910.1450, Occupational exposure to hazardous chemicals in laboratories.

Quartzy: Quartzy.com is a free website where laboratories can manage their chemical and equipment inventories, track order requests, and manage the use of shared laboratory equipment. Ames Laboratory has determined that Quartzy is the preferred software for tracking chemical inventories. Other database management systems or spreadsheets may be used, as long as an annual report to ESH&A is provided in a Quartzy-compatible format.

The use of Quartzy for chemical inventories, while not required, is strongly encouraged. The interface is easy to learn, and the support team at Quartzy will assist in transferring inventory from spreadsheets or other databases into the Quartzy format.

The presence of a product catalog in the Quartzy system does not represent Ames Laboratory recommendation or approval of the vendor; routine purchasing procedures are not altered by the use of Quartzy.

Safety Coordinator: A safety coordinator may be appointed by a Division Director (DD), Institute Director (ID) and Program Director (PD) or Department Manager (DM).The safety coordinator serves as a liaison between ESH&A and the DD/ID/PD/DM.

5.0 PREREQUISITE ACTIONS AND REQUIREMENTS

Designation of Roles:

Chemical Inventory Specialist: Chemical Inventory Specialists are staff members of ESH&A, responsible for assisting researchers in conducting their chemical inventory, maintaining records regarding the status of the chemical inventory effort, and providing periodic reports to ESH&A.

Chemical Inventory Coordinator: Appointed by the Group Leader, the Chemical Inventory Coordinator is responsible for supervising the efforts of the Chemical Inventory Specialists and providing periodic updates to line management. At the close of each annual data call period, the Chemical Inventory Coordinator will provide a summary report to line management describing the status of the annual inventory, any difficulties encountered, and making recommendations for continuous improvement of the process.

ESH&A Manager: Shall designate a Chemical Inventory Coordinator for the Ames Laboratory.The ESH&A Manager shall also inform Executive Council, upon request, of the status of the chemical inventory, and inform group leaders and supervisors of any significant non-compliance within their groups.

Group leaders: Shall identify the responsible person(s) for conducting and maintaining the chemical inventory in their area of responsibility. Group leaders should also determine whether other information such as laboratory SOPs and SDS will be uploaded to Quartzy or maintained in another manner. Group leaders may delegate the authority for selection to supervisors within their group. The group leader or his/her designee shall notify eshadesk@ameslab.gov of the name and email address of each individual responsible for the chemical inventory for each laboratory or operational area.

Supervisors: Shall ensure that personnel assigned to conduct the chemical inventory are adequately trained conduct the chemical inventory safely, and shall enforce the safety precautions necessary to do so. Supervisors shall provide adequate PPE and time required to conduct the inventory in a safe manner.

6.0 PERFORMANCE STANDARD

6.1 Minimum Requirement

The minimum requirement is for each group to provide a complete chemical inventory in an approved format to ESH&A annually. The inventory must include the location of the inventory to building and room level, identity of the chemical products, and the quantity on hand.

The annual inventory call will be sent October 1, with the expectation that all inventories are verified by December 1.

6.2 Best Practice

The best practice is to continuously maintain an accurate chemical inventory at all times, providing monthly updates to ESH&A. An additional best practice is to utilize the annual inventory process to ensure that chemicals maintained in inventory are in good condition.

7.0 PROCEDURE

7.1 Materials and Equipment

7.1.1 Personal Protective Equipment

- Safety glasses or goggles
- Chemical resistant gloves
- Lab coat or apron to protect personal clothing
- Other PPE as required based on hazard

7.1.2 Other Materials

- Spill control kit and fire extinguisher should be readily available
- Water and wipes or paper towels to clean exterior of bottles as required
- Trash bags
- Desktop computer, laptop, tablet, or laptop (Note that Quartzy is a web-based database. If you have access to the internet in the laboratory, the inventory process is facilitated. If you do not, the inventory may be taken in Excel or similar format and uploaded to Quartzy later, or taken on paper and entered into the computer later.)
- (Optional) Paper inventory sheets, if field inventory will be taken on paper and transcribed to computer
- (Recommended) Cart or ample bench room with liquid-tight secondary containment bins for sorting
- Blank Labels, permanent marker such as a Sharpie®
- Adhesive file coding dots
    - CY 2016 inventory – blue
    - CY 2017 inventory – yellow
    - CY 2018 inventory - red
    - CY 2019 inventory – green

7.2 Materials That Must Be Inventoried

7.2.1 Hazardous Chemicals Requiring Individual Inventory

All commercial hazardous chemicals stored in the laboratory space must be physically inventoried and reported annually. This inventory is understood to represent a snapshot in time.

ESH&A strongly encourages adding newly procured chemicals to the inventory when acquired, and deleting items from the inventory as soon as use is permanently discontinued and they are removed as unwanted materials.

7.2.2 High-throughput Chemicals

For very common chemicals such as solvents with a high throughput and regular ordering procedure, the laboratory can report the highest quantity normally kept and discontinue container-by-container tracking for that material.

Example: A laboratory uses about four 4-Liter bottles of acetone each month, and orders a new case of four 4-L bottles when the last bottle is opened. This laboratory reports acetone as "5 x 4-liter bottles" regardless of whether the actual stock on hand is exactly 5 bottles on the date of the inventory. Individual containers of such items need not be tagged with annual color coded inventory dots. They may be marked "HTC" ("High-throughput chemicals"). The reported inventory should note the HTC status of the chemical in the description field.

Carcinogens and highly toxic chemicals may not be placed into HTC status.

7.2.3 Materials for Which Aggregating the Inventory is Acceptable

Laboratory-created materials or laboratory samples may be aggregated for inventory purposes.

For example: An analytical laboratory has a very large collection of samples that have been or will be analyzed, each in a 2-mL vial.

At a minimum, each vial should be labeled with a reference number that uniquely identifies the vial and that permits the contents to be identified from a research notebook, database, or other reference document.

For the purposes of the annual chemical inventory, the vials need not be itemized, but can be reported as an estimated aggregate quantity.

For example: Archived samples for metals analysis, in aqueous solution: Quantity=1680, Size = 2-mL. Estimated total < 4 L.

Samples with dissimilar hazards should not be aggregated. In the example above, the samples for analysis in aqueous solutions can be aggregated with similar samples, but samples in a flammable solvent should be reported on a different line.

7.2.4 Materials for Which Inventory is Not Required

Household consumer products when the products are used in the workplace in the same manner that a consumer would use them need not be individually inventoried.

This exemption only applies where the duration and frequency of use (and therefore exposure) is similar to or less than what the typical consumer would experience. For instance, window cleaner used infrequently by laboratory staff to clean the windows need not be inventoried. However, window cleaner stocked and used daily by custodial staff to clean many windows a day does need to be inventoried by custodial services, because the duration of use is greater than that of a typical consumer.

7.2.5 Training

Chemical Hazard Communication training is required for individuals assigned to the inventory task. Specific training in the inventory procedure is strongly recommended to prevent re-work.

Video training modules in the use of Quartzy are available on the Quartzy site.

ESH&A has an inventory cart available. It may be checked out to a research group for up to three days. This cart has all the items needed for a laboratory inventory project except for a computer.

7.3 Step-by-step Procedure

Step 1: Register for Quartzy, if necessary

The group leader or his/her designee should create a free account at Quartzy.com. The creator of the account can add any number of administrators to work on the project.

If your group has opted not to use Quartzy, the inventory must be provided in a spreadsheet with a specific format so that it can be uploaded to Quartzy by ESH&A. Please contact the Chemical Inventory Coordinator for details.

Step 2: Add ChemInventory (ESH&A) contact

Add cheminventory@ameslab.gov to your Quartzy Group. This will allow ESH&A to review the inventory as required. You can control the access privileges as a group administrator.

Step 3: Backup Plan

When viewing your Quartzy® inventory, go to “Settings” at the bottom left of the screen and set up monthly backups. Your inventory backup will be emailed directly to you as an Excel spreadsheet. We recommend using this as a reminder to update any items that have been received or discarded.

Step 4: Conduct the physical inventory

The following procedure is recommended:

Stop
Think: Am I physically and mentally ready to work with hazardous chemicals?
Check: Do I have the appropriate PPE, spill materials, and emergency plan in place?
Do Work Safely

Clean and Inspect

- Don chemical-resistant gloves.
- Remove all bottles and jars from a cabinet or shelf in manageable numbers, and place in secure location.
- Inspect bottles and labels for condition.
- Wipe clean if necessary.
- Renew or refresh labels if required.
- Inspect storage area – make sure there are no spills, the shelving supports are still sturdy, there is no excessive corrosion, secondary containment is in place and in good condition, and the cabinet is appropriately labeled for the contents.
- Sort materials first by hazard, not alphabetically.
- Set aside any materials that are unwanted.

Review Against Existing Inventory

- If there is an existing Quartzy inventory, there are two ways to edit. First, you can edit any individual item. If you only have a few items to change, searching for them using the search function and editing the record is a reasonable approach.
- Second, Quartzy allows batch editing. This is the best approach if you have many changes and deletions.
- To batch edit, use Quartzy's export function to download the inventory to an Excel spreadsheet. You can print it or put it on a tablet for editing.
- Verify each item as described below, and make any changes or mark records for deletion on the Excel spreadsheet.
- Uploading the revised spreadsheet updates the entire inventory.
- Be advised that Quartzy's lookup feature is the best way to enter a new item. See next section for more information.

Enter Item Into Inventory

- Use Quartzy's lookup features to quickly enter chemical names without spelling errors.
- Common laboratory chemical vendors host their catalogs on Quartzy; the vendor and catalog number are all you need to know to enter the container details.
- Be sure to verify the entire chemical name.
- Laboratories with many inventory items may benefit from using Quartzy's function to add sub-locations within the laboratory.

Apply Inventory Code Dot

- Place colored inventory coding dot, in the color specified for the year, on bottle (do not obscure label). The bottle cap can be used if there is no other option.
- The coding dot allows you to know at a glance if the material has been inventoried.
- Quality assurance checks of the inventory may be performed by third parties. Do not place dots on materials that you have not entered into your inventory.
- If desired, you can write a code for a sub-location on the inventory dot to help with laboratory organization.

Check Labeling

- For laboratory spaces, make sure that the manufacturer's label has not been removed or defaced.
- Make sure that the label reflects both the identity and the hazards of the chemical.
- If special labeling is required, such as for nanomaterials, be sure both the inner container and any overpack or secondary container has the special labeling information.
- Make sure bins used to organize laboratory materials are labeled with the class and the hazards of the materials within the bin.

Restore to Shelf

- Return wanted items to shelf or cabinet, segregated by hazard class.

Clear out Unwanted Materials

- Contact ESH&A or EH&S (Iowa State Buildings) for pickup of unwanted materials.

Notify ESH&A

- If Quartzy is being used, and cheminventory@ameslab.gov is receiving monthly backups by email, no notification is required.
- If inventory is not being kept in Quartzy, provide your annual inventory update in approved format to cheminventory@ameslab.gov by email during October/November.

8.0 POST PERFORMANCE

Field verification of the chemical inventory will be conducted during Readiness Review site visits, and may be conducted at any other time during announced or unannounced laboratory or operational walkthroughs.